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ABSTRACT

A task force sought to determine the information needs of the Tulsa Public Schools (Oklahoma) by studying goals of the school district, identifying all processes necessary for operation of the school system, and conducting interviews with 48 key members. A detailed information systems matrix was constructed to show the interrelationships between departments within the organization, the process essential to the operation of the schools, classes of data required, and necessary information systems. Among nine conclusions reached by the task force was that a district crisis in data processing appears imminent. The "application approach" being followed seriously restricts access to data, and there is excessive manual processing of data. Also, present data processing equipment, systems, and staff are inadequate. The task force made 12 recommendations, including that data processing capabilities should be upgraded immediately and an integrated data base developed; a long-term commitment must be made to the project; priority should be given to data bases in student, financial, and personnel records; and early emphasis should be given programs that directly serve students. A lengthy appendix discusses methodology, process definitions, current systems review, interviews, analysis of information systems needs, the information systems network, and risk assessment and prioritization. (Author/JM)

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INFORMATION SYSTEMS PLAN

Prepared by the
Information Systems Task Force

with the assistance of the
Department of Research, Planning and Development
Dr. Paul I. McCloud, Assistant to Superintendent

Dr. Larry L. Zenke, Superintendent

Tulsa Public Schools
Tulsa, Oklahoma

October, 1978

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ACKNOWLEDGMENTS

Current, reliable information is the life blood of any organization. This is particularly true of the Tulsa Public Schools, a complex institution whose 5,000 employees must coordinate their efforts to serve 55,000 students in 00 schools. The inadequacies of our present information systems have become more and more evident in recent years as the requirements for data have increased dramatically. It was for these reasons that I asked this Task Force to study and recommend to me a plan for more adequately serving the information needs of our school district.

The Information Systems Task Force members listed on page iii were chosen because of their familiarity with various aspects of school district operations. The two teachers were appointed by the Tulsa Classroom Teachers Association. The Tulsa Personnel and Guidance Association named the counselor member of the Task Force. The two principals were designated by the Tulsa Association of Secondary School Principals and the Tulsa Association of Elementary School Principals. The other six members were selected from departments having key responsibilities in the production and use of information vital to the ongoing operations of the school system. Collectively, these eleven persons represented a broad cross-section of the school district, thus enabling them to study information needs from every possible perspective.

Much credit is due these members of the Task Force. Few school systems have attempted such an intensive study as this, and it was only through the skill and the determination of this group that the task was completed. In behalf of the children whom we all serve, I commend them for their tireless dedication.

Appreciation is also extended to IBM Corporation personnel Mr. Mario Vitale, marketing representative, and Mr. Ed Van Schaik, senior systems engineer, who served as consultants to the Task Force. Their assistance was invaluable in the conduct of this study.

Finally, I extend my thanks to the many staff members who participated in the Task Force interviews. It was their observations and suggestions which enabled the Task Force to come to a more complete understanding of the information flow and the information needs of the complex organization known as the Tulsa Public Schools.

Over the next several months, as we implement various recommendations of this Task Force, I am confident that more adequate information will be made available to administrators for decision making, more complete student data will become readily accessible to teachers, and direct learning opportunities for pupils will be greatly expanded. Surely these benefits will make worthwhile the considerable efforts expended by all who cooperated in this study.

Larry L. Zenke
Superintendent of Schools

October 9, 1978

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EXECUTIVE SUMMARY

The growing complexity of almost all business operations makes accurate, timely information increasingly essential. To cope with the mass of data required, virtually every business or institution today views computerized data processing not as a luxury but as an absolute necessity.

Although the Tulsa Public Schools were early users of the computer, few improvements have been made since the first system was installed in 1964. As a result, it is becoming increasingly difficult to meet the burgeoning data requirements of today, and impossible to meet those of the future, unless major improvements are made in the data processing capabilities of the Tulsa Public Schools. The Superintendent therefore appointed the Information Systems Task Force in May, 1978 to develop and recommend a plan of action to him.

The Task Force sought to determine the information needs by studying the goals and objectives of the school district, identifying all the processes necessary for the operation of the school system and conducting interviews with forty-eight key staff members. A detailed information systems matrix was constructed to show the interrelationships between the various departments within the organization, the processes essential to the operation of the schools, the classes of data required and the necessary information systems. The findings of the Task Force are reported under seven major process categories, together with an analysis of problems and recommended actions for each.

Conclusions of the Task Force are as follows:

1. A crisis in data processing operations appears imminent.
2. The "applications approach" being followed seriously restricts access to data.
3. There is excessive manual processing of data.
4. Present data processing equipment, systems and staff are inadequate.
5. There is strong support for increasing data processing capabilities.
6. Student records, personnel records and financial systems were the most requested services.
7. An improved information system is a necessity.
8. Coordination between the Information Systems Services Department and users will be critical.
9. The information system must support the instruction process and insure financial accountability.

Following are the actions recommended:

1. Data processing capabilities should be upgraded immediately, including development of an integrated data base.

2. A long-term commitment must be made to this project.

3. The necessary resources for this project should be granted.

4. Priority should be given to data bases in student, financial and personnel records.

5. Early emphasis should be given programs that directly serve students.

6. The information system should serve top management's needs.

7. The Information Systems Services Department should report as high up in the organization as possible.

8. Salaries must be upgraded in the Information Systems Services Department.

9. A person should be employed to coordinate between the users and the Information Systems Services Department.

10. Data terminals should be installed as rapidly as finances permit.

11. All users must be oriented to the system.

12. A permanent steering committee should be appointed for this program.

An action plan is recommended for the implementation of the twelve most urgently needed systems. Implementation of these priority systems should take about thirty months, after which other systems can be installed as time, staff and finances permit.

TABLE OF CONTENTS

	Page
Acknowledgments	ii
Members of the Information Systems Task Force	iii
Executive Summary	iv
I. INTRODUCTION	1
Importance of Information Systems	
History and Background of the Study	
Purpose of the Study	
Scope of the Study	
Work of the Task Force	
II. FINDINGS	4
Student	
Curriculum and Instruction	
Personnel	
Finance	
Facilities and Equipment	
Supplies and Services	
District Management	
Information Systems Services Department	
III. CONCLUSIONS	8
IV. RECOMMENDATIONS	10
V. ACTION PLAN	12
Equipment	
Systems	
Staffing	
Users	
Summary	
APPENDIX A: Methodology	15
APPENDIX B: Process Definitions	17
APPENDIX C: Current Systems Review	22
APPENDIX D: Interviews	25
Interview Process	
Interviewees	
Sample Forms	
Interview Findings	
APPENDIX E. Analysis of Information Systems Needs	36
Organization/Processes Matrix	
Organization/Data Classes Matrix	
Systems/Data Classes Matrix	
Systems/Processes Matrix	

Table of Contents (Continued)

APPENDIX F: Information Systems Network 41
School District Data Structure
Proposed Network
Information Systems Definitions

APPENDIX G: Risk Assessment and Prioritization 49

Chapter I

INTRODUCTION

Importance of Information Systems:

Over the past few years there has been a dramatic increase in interest in information systems planning. This is caused by the growing complexity of almost all business operations, thus making accurate, timely, complete information absolutely essential to sound decision making. It is now recognized that data constitutes a valuable resource which must be used wisely if the organization is to achieve its objectives.

But data alone is not information. If data is to serve as useful information to the decision maker, it must be compiled, categorized, combined, meaningfully displayed and made readily available. Unfortunately, all too many organizations, including the Tulsa Public Schools, may be characterized as "data rich but information poor," because of their inability to promptly process raw data into a usable decision-making format.

If the above explication sounds like a justification for electronic data processing equipment, then so it is. In this era of nostalgia, there is an understandable desire to return to the simpler life of ledger sheets, rotary calculators and mimeograph machines. But business, even school business, can no longer operate this way. Even if we could afford the excessive clerical costs in such a manual operation, we could never meet the time deadlines of day-to-day operations. Someone has said that mankind's dependence on the computer is now irreversible. Like it or not, our destinies are inextricably tied to the computer. Since there is no turning back, or even standing still, the only option is to plan the most reasonable course of action and pursue it.

History and Background of the Study:

The first data processing equipment was installed in the Tulsa Public Schools in 1964. Software systems were written to utilize the computer in various applications, primarily attendance and financial accounting. Over the years, other applications were added such as personnel information, statistical analysis of research data and student records. In 1973 a slightly larger computer was installed but the data processing operation continued essentially unchanged.

Since 1964 the data needs of the Tulsa Public Schools have increased dramatically. Particularly critical are the reporting requirements of various federal agencies regarding desegregation, handicapped children, bilingual education and other civil rights programs. A further problem is the inaccessibility of information required for effective decision making, such as the operational costs for various programs, personnel counts by categories, and the residence of pupils in relation to schools they attend. Perhaps just as critical is the fact that despite the demonstrated capacity of computers for educational programming, we are still unable to give direct support to the instructional process.

Aware of the inadequacies of our present information capabilities, the Superintendent formed the Information Systems Task Force in May of 1978 to study the information needs of the Tulsa Public Schools and to recommend a plan of action to him.

Purpose of the Study:

The charge given to the members of the Information Systems Task Force following their appointment on May 17, 1978, was "to study the information needs of the Tulsa Public Schools and to recommend to the Superintendent a plan for meeting those needs most effectively." Two important elements should be noted in this statement of purpose.

1. The Task Force was directed to study the information needs of the school district, not the computer needs. These individuals were not familiar with the operations of computers and were not expected to be. But collectively they were very familiar with school operations. Using the Information Systems Planning (ISP) methodology, as described in Appendix A, they conducted an intensive study of the information requirements at every level of the school system. Specific recommendations as to what equipment, systems and personnel will be required to meet our information needs will have to be developed by technical personnel familiar with the intricacies of data processing.

2. The Task Force was appointed to serve only in an advisory capacity to the Superintendent. Following his analysis of the report, he will make his recommendations to the Board of Education.

Scope of the Study:

From the beginning, it was recognized that a study of the information needs of the entire school system would be a major undertaking. Consideration was given to studying only a single group of operations, such as the Business Division, or one level, such as senior high schools. However, the interrelationships between the various levels and departments were found to be so involved that the decision was made to study the entire school system. While a study of this magnitude was very time consuming and required the gathering and analysis of much data, the Task Force believed that anything less would not have been adequate. It is hoped that the results of this study will provide a sound basis for more adequately meeting the information needs of the Tulsa Public Schools.

Work of the Task Force:

Following a week of training in the Information Systems Planning (ISP) methodology described in Appendix A (p. 15), the Task Force worked full time from July 5 through August 15. Their first step was to identify all the processes necessary for the operation of the school system. These are shown in Appendix B (p. 17). With the assistance of the Information Systems Services Department, the Task Force also reviewed all the systems now in use. This summary is reported in Appendix C (p. 22). Next they determined the extent of involvement of the various departments in each process. Results of this analysis are shown as an "Organization/Processes" matrix in Appendix E (p. 36).

The Task Force then conducted interviews of approximately two hours each with forty-eight staff members, ranging from the Superintendent to a school clerk, as described in Appendix D (p. 25). The purpose of these interviews was to verify the involvement of each department in the various processes and to learn their additional information requirements. Many valuable insights into school district operations were derived from these interviews. These are presented in Chapter II and are further delineated in Appendix D.

The next step of the Task Force was to design the Information Systems Network shown in Appendix F (p. 41), which contains six major systems groups and twenty-six systems or applications. Shown in Appendix E (p. 36) are also three additional matrices plotting the interrelationships and dependencies between the organization, the processes, the systems and the data classes for the Tulsa Public Schools.

The final step in the analysis of the data was the conduct of a risk assessment to prioritize the order in which the various data systems would be recommended for implementation. Appendix G (p. 49) summarizes the findings of these last two steps.

The Task Force reached nine major conclusions (Chapter III) and offered twelve significant recommendations (Chapter IV), together with a plan of action (Chapter V) suggesting how those recommendations can be implemented. Since these are the product of more than six weeks of intensive study, they are believed to describe the most viable course possible for improving the information processing capabilities of this school district.

Chapter II

FINDINGS

The executive interviews, though very time consuming, proved to be a rich source of data. The Task Force was very impressed with the capabilities of the various staff members interviewed and with the complexity of their jobs. Repeatedly, the comment was heard that there is much data available but it is not readily accessible for decision making. There seemed to be a general recognition of the need for assistance. None of the interviewees expressed opposition to plans to upgrade our information systems and all seemed to accept the fact that more financial resources will have to be budgeted for this department. The attitude of most interviewees was that there is a critical need to improve our information services and that they would gladly assist in implementing such a system.

Careful notes were kept of every interview. These were then "cut and pasted" to facilitate the grouping of similar comments or observations into meaningful categories. Results of these interviews are summarized here, with a more complete analysis being presented in Appendix D.

The interview results below are grouped under the seven major processes described in Appendix B, plus a category related to the Information Systems Services Department itself. Note that each item is expressed as a desired or needed improvement.

I. Processes related to the STUDENT.

There is a need for:

A. The development of an integrated student data base.

B. Greater accessibility of student information for external reporting.

C. More adequate public information.

D. Major improvement in our reporting and analysis capability.

E. More adequate follow-up information on former students.

II. Processes related to CURRICULUM AND INSTRUCTION.

There is a need for:

A. Expanded data processing capability to support master scheduling.

B. More adequate information for curriculum planning, development and evaluation.

C. Computer support of the educational and career guidance functions of Guidance and Counseling.

D. Expanded computer scoring of standardized tests.

E. Improvement in relating budgets to programs.

III. Processes related to PERSONNEL.

There is a need for:

A. Development and implementation of an integrated personnel data base.

B. Improved computer capability for processing payrolls.

C. Increased automation in the processing of personnel records.

D. Increased automation in preparation of the Salary Book.

IV. Processes related to FINANCE.

There is a need for:

A. Development and implementation of an integrated financial data base.

B. Increased data processing support for forecasting, budgeting and analyzing district funds.

C. Increased data processing support for writing proposals for federal funds.

D. Automation of the revised accounting procedures required by State Accounting Handbook II.

E. Data processing support for analyzing and reporting the cost of operation in individual schools, instructional programs and transportation.

F. Data processing support for detailed budget reporting to users.

G. Data processing support for bookkeeping and auditing Student Activity Funds.

H. Increased data processing support for external auditing.

V. Processes related to FACILITIES AND EQUIPMENT.

There is a need for:

A. Data processing support of inventories of furniture, equipment, raw materials, buildings and sites.

B. Automation of statistical information on buildings and sites.

C. Automated scheduling of buses, instructional media equipment, facilities and maintenance services.

VI. Processes related to SUPPLIES AND SERVICES.

There is a need for:

A. Increased data processing support of inventories of custodial supplies, industrial arts materials, curriculum materials and supplies, textbooks, and instructional media software.

B. Computerized scheduling of instructional media software.

C. Data processing support in ordering, purchasing and inventory of food supplies.

D. Computerized verification of receipt of materials.

VII. Processes related to DISTRICT MANAGEMENT.

There is a need for:

A. Greater availability of needs assessment data.

B. A network of information systems which can support management, operational, planning, research and evaluation activities.

C. Improved ability to evaluate progress toward district objectives.

D. Improved research and evaluation support of planning efforts.

E. More adequate information for setting program priorities for budget allocation and reallocation.

F. Timely, accurate budget information for all users.

G. Automated assistance in monitoring proposed legislation for its impact on the school district.

H. Improved availability of information about school district activities for internal exchange and public release.

I. Improved capability to meet external reporting requirements.

J. Greater awareness of the purpose and use of information and improved procedures for the management of information.

K. Improvement in the quality of information as to timeliness, accessibility, accuracy, reliability, applicability and completeness.

INFORMATION SYSTEMS SERVICES DEPARTMENT

There is a need for:

A. Expanded and updated computer equipment and software programs with the capacity for handling the integrated data bases needed by the school system and for analyzing efficient use of the machines.

B. A larger data processing staff, adequate for the expansion of data processing services.

C. Improvement of salaries of data processing personnel, to facilitate the employment of competent, experienced programmers and analysts.

D. Development and implementation of integrated data bases: financial, student, personnel.

E. Improvement of confidence of computer users in the integrity of data by increased timeliness and accuracy and elimination of redundancies.

F. Increased awareness among computer users of the value of the computer as a resource for management and instruction.

G. Development of an overall philosophy of data processing with a recognized plan for information systems development and implementation and for setting computer priorities.

H. Increased, uninterrupted working time of data processing staff by employment of a person to serve as liaison between computer users and data processing staff.

I. Insurance on data processing programs.

J. Improved security of the computer room: Halon fire protection, security of manual back-up records.

Chapter III

CONCLUSIONS

In its study of the information needs of the total school system, the Task Force collected a great deal of data. But data becomes usable information only after it has been categorized and analyzed. This the Task Force spent considerable time doing. Certain conclusions, such as the fact that our data processing department is approaching a crisis, were obvious almost from the outset. Others were more subtle, such as the recognition that coordination with users will be essential. In any case, the nine conclusions offered below are the product of much deliberate weighing of evidence by the members of the Task Force.

1. Our present data processing operations are so deficient that a crisis appears imminent. One of the most critical applications is the processing of payrolls, a system which could conceivably become inoperative at almost any time unless prompt remedial action is initiated. Data storage and processing capabilities are not adequate to meet increasing user needs. For example, we are unable to meet requests for better methods of tracking and inventorying equipment, facilities and supplies. Staff members are also eager to have on-line, random-access computer terminals to permit frequent, direct updating of files and immediate retrieval of information from student, personnel and financial records. Unless we can better meet the reporting requirements of various regulatory agencies and the other information needs of our school system, we will suffer an embarrassing loss of credibility and a serious loss of income.

2. The "applications approach" we have followed in the processing of data seriously restricts our access to valuable information. Not unlike other early users of computers, the Tulsa Public Schools developed separate stand-alone files and software to perform data processing services for various departments. The difference is that most large organizations later adopted the philosophy of a totally integrated data base accessible to all users, while our data files are still structured to serve only single applications. As a result, we are today "data rich and information poor," a condition which seriously affects the managerial decisions of our top administrators. This great mass of data can be made truly functional only by the development of a totally integrated data base with no redundancies in files.

3. There is excessive manual processing of data. It was noted in many interviews that numerous records are still kept by hand. While some manual systems may always be needed, data processing support could provide much assistance, eliminating costly hand processes while at the same time providing more complete and accurate data.

4. Our present data processing equipment, systems and staff are inadequate to support an expanded information systems network. To provide the quality of services needed, three things will be required:

   a. More sophisticated equipment having greater capacity and versatility.

   b. New or completely revised systems software written in a currently used computer language.

   c. Retraining of current employees, new personnel to fill existing vacancies and salary incentives sufficient to attract and hold a qualified staff.

5. There is strong support for increasing our data processing capabilities. The Task Force was most impressed with the high degree of cooperation and interest it encountered in the interviews. Administrators, teachers, counselors and clerks were unanimous in their expressions of needs and their hopes that increased data processing support will result from these efforts.

6. Student records, personnel records and financial systems were the applications most often requested by the interviewees. Implementation of these systems should be of great help in such areas as public relations, support of instructional processes and improvement of cost efficiency throughout the school system.

7. Support of an improved information system to meet ever-increasing needs is a necessity. While the plan offered by this Task Force will be costly in the initial stages, it will result in many tangible and intangible benefits over time. Despite the cost, we simply cannot afford to stagnate in our present condition or we will find our school system unable to meet the ever-increasing needs of our students, the demands of the community, and the requirements of various regulatory agencies. The highest degree of continuing support will be required from the Board and the administration if this project is to succeed. This support must be not only financial but also a commitment of their time to aid in the development of the required systems.

8. A high degree of coordination between the Information Systems Services Department and the users will be of paramount importance. Data processing personnel cannot design a system without the assistance of those who will ultimately be using the reports produced. Each user must first define his specific requirements in a form that lends itself to computer operations. Then he must work with data processing personnel in the writing and testing of the programs. Finally, the user will need training in methods of retrieving and interpreting the data he requires. Only in this way can an effective information system be developed and implemented.

9. The success of any information system in the Tulsa Public Schools will be dependent on how well it supports the instruction process and insures financial accountability. Since education is our business, the ultimate test of the system will be its benefits to students. Therefore direct instructional applications of computer technology must receive priority in this project. At the same time, it is recognized that the administration of the school system must also have adequate computer support. Of prime importance is the management of financial resources, an area of school operations which is frequently subjected to public scrutiny. Adequate service in these two areas should virtually insure the success of any information system.

Chapter IV

RECOMMENDATIONS

The recommendations offered below are deliberately general in nature. Because data processing is such a highly specialized field, the Task Force sought only to point a direction, not to plot a specific course for the development of a more adequate information system for the Tulsa Public Schools. The further delineation of requirements for equipment, personnel and systems will therefore be the responsibility of the Information Systems Services Department and other administrative staff and consultants. It is hoped, however, that these recommendations will be helpful as a guide to their efforts.

1. Immediate action should be taken to upgrade the data processing capabilities of the Tulsa Public Schools, with a fully integrated data base as the ultimate goal. All users should have access to the data base, with appropriate security controls to prevent access to those files for which a given user is not authorized. A fully integrated data base would eliminate the need for duplicate files, thus making more efficient utilization of the computer's data storage capabilities and also increasing data reliability.

2. A long-term commitment should be made to this project to assure its success. Full implementation of the project will extend over several years. However, changes in administrative or Board personnel should not be allowed to affect the project adversely. A later shift in philosophy could well nullify the initial investment of time and resources in the project and dangerously delay achievement of the ultimate goal.

3. The Superintendent and the Board should approve the resources recommended by the Information Systems Services Department as necessary to implement this plan.

4. Priority should be given to the development of data bases in student, financial and personnel records. These are the needs most often expressed by users during the interviews. A more detailed description of these priorities is given in Appendix G., as well as in the SYSTEMS DEVELOPMENT SCHEDULE presented on page 14.

5. The Task Force recommends early emphasis on programs that will directly benefit students. These include Computer Assisted Instruction (CAI), Computer Managed Instruction (CMI) and Computer Assisted Guidance.

6. The information system should be designed to serve the needs of top management. It should include capabilities for making statistical analyses, compiling summary data, indexing policies and legal requirements, ad hoc reporting and modeling hypothetical management problems.

7. The Information Systems Services Department should report as high up in the organization as possible. This will facilitate the crossing of divisional lines and allow the department to support all functions equally.

8. The upgrading of salaries in the Information Systems Services Department is recommended. Not only must present personnel be retained to maintain the current systems, but new staff must be recruited to design and install the more advanced systems herein proposed. If we are to attract and hold the experienced, qualified personnel required, our salary and fringe benefit

schedules must be competitive with those of business and industry, not just public agencies, in the Tulsa area.

9. A person should be employed to coordinate developmental activities between the users and the Information Systems Services Department. Data processing personnel do not understand the needs of educators and educators do not understand the parameters within which data processors must work. Communication between the two groups can be greatly facilitated and much time saved by a person who has some understanding of both fields. Such an interface person will be valuable at all stages but particularly during the development of instructional applications programs. A person with a teaching background who could be trained in the fundamentals of data processing would be the most likely candidate for this position.

10. Data terminals should be installed as rapidly and in as many areas as finances will permit. This remote access capability is viewed as a highly desirable means of making data a functional resource. Eventually, data input should also originate at the source level via these same terminals. To insure the accuracy of data, personnel designated to operate these terminals will need special training.

11. All users must be made aware of the capabilities and limitations of the information system. If the system is to adequately serve its intended purpose, users must understand what it is, and is not, capable of doing and how they can receive its services. This will require one or more orientation sessions, plus printed instructions and individual help from the interface person recommended in item 9 above.

12. The Task Force recommends that a permanent steering committee be appointed to monitor progress in the implementation of this program. The steering committee should be representative of various user groups in the school district, including some members of the original Task Force. This steering committee should meet twice each year, or as needed, to review progress on the project as compared with the original plan of action. A written report of each meeting should be prepared advising the Superintendent of accomplishments to date and recommending any further actions needed to enhance the implementation efforts.

Chapter V

ACTION PLAN

The plan of action herein recommended is designed to bring the information system of the Tulsa Public Schools up to an acceptable level of efficiency. While the inadequacies of the present information processing capabilities have become particularly evident over the past two years, it must be pointed out that these problems have been accumulating for a much longer period than that. As a result, to reach the necessary level of efficiency will now require concerted and sustained effort in each of the areas described below.

Equipment:

First is the problem of inadequate, outdated equipment. The computer configuration we now have first came on the market about twelve years ago. In addition, it is being used to emulate the operational mode of the earlier, even more outdated equipment previously in use in the Tulsa Public Schools. A complete revision of the software systems would be necessary to enable this computer to effectively handle the present data processing applications. However, even this would not allow for the addition of many vitally needed services already identified and others anticipated in the near future.

The only reasonable solution appears to be the acquisition of a larger, more current computer, along with the necessary peripheral equipment. It is essential that this equipment be capable initially of processing Autocoder, the language in which most of our present systems are written. Once these programs have been replaced or rewritten in COBOL, many more equipment options can be considered. It is suggested that a relatively small computer of the fourth generation series be leased until this conversion can be completed, which will probably require at least a year. At that time, larger equipment should be installed to accommodate the additional applications recommended. This schedule would delay incurring the higher rental cost until the larger equipment is actually required. It would also allow more time for study to be certain of what is needed and would permit consideration of any new equipment models which might come on the market during the interim.

Systems:

The second problem concerns the systems or the software programs now in use. Most of these were developed in the 1960's with each system serving a single function or application. With no interface between the various files, such as finance, personnel or attendance, any data analysis involving more than a single file must be done manually. What is needed is an integrated data base with minimal redundancy in files and with the ability to access, combine and manipulate data from all the various files to produce a single report. In addition, almost all the present systems are written in Autocoder, a computer language unique to the first computer we had. This language has not been widely used for more than a decade, having been replaced by COBOL and other more universal languages. The rewriting or replacement of these systems is perhaps the most critical problem we face.

Three options to this dilemma seem apparent. One is to employ systems analysts and programmers to redesign and rewrite all these systems. Another alternative would be to have our staff analyze and design the systems and then contract

the actual programming to an outside firm. The third option is to purchase "package" systems from a commercial firm and modify these as necessary to fit our local requirements. Considering the urgent need to move quickly, the unavailability of good systems personnel, and the high reliability level of vendored programs, the third option appears to be the wisest choice.

Staffing:

Closely related to the problems of equipment and systems is that of personnel. There are presently three vacancies in the programming section of the Information Systems Services Department. Being members of a dynamic profession, capable programmers and systems analysts are reluctant to come to work for an organization using equipment and systems that were replaced in most companies five to ten years ago. In addition, the scheduled salaries for these positions are so low that we cannot compete with industry in attracting the experienced individuals we need. At the same time, present staff members must maintain the existing systems until these can be converted to COBOL or replaced. Then these same personnel must be retrained to service the new systems and utilize the fourth generation equipment.

Users:

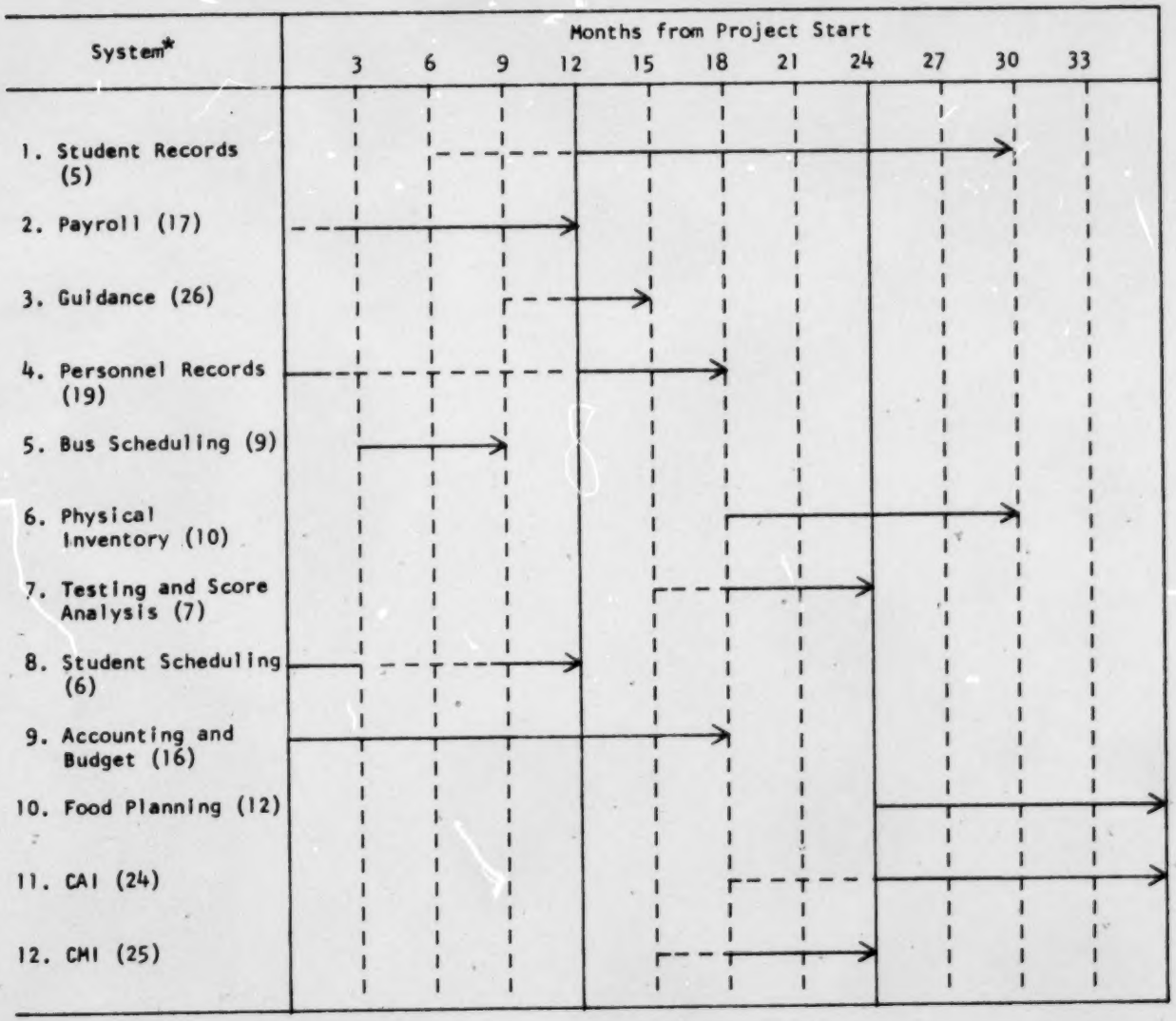
The final essential element in the design and implementation of an effective information system is the cooperation of the users, who are the personnel in the departments served by the Information Systems Services Department. If a system is to produce the information needed, that system must be carefully designed to include the required elements. To accomplish this, heads of principal user departments, such as Accounting and Attendance and Census, may be required to spend many hours every day for several months working with systems analysts in the design and testing of systems software. The intensive involvement of such key personnel as these will require not only their commitment but also support from others in their respective departments, possibly even including the employment of temporary substitute personnel to release regular staff members for these developmental activities.

Summary:

It is evident that the design and implementation of the total information system envisioned herein will require many months of intensive effort and a substantial commitment of resources. Even after approval by the Board, progress will be heavily dependent on such factors as availability of personnel, delivery of equipment, cooperation of users and the final sequence and priority assigned to the development of the various systems.

The following Systems Development Schedule estimates the time required to implement the first twelve major systems as recommended in Appendix G (p. 49). It should be emphasized that this schedule assumes the prompt delivery of equipment, the purchase of systems "packages," the availability of qualified personnel and the ready cooperation of users. Scheduling of the remaining systems, identified as of lesser priority than the ones shown, was not attempted. Plans should be made for implementing these additional systems only after those of higher priority have been successfully installed.

SYSTEMS DEVELOPMENT SCHEDULE



* Systems are listed in order of priority as recommended by the Task Force on p. 50. The numbers in parentheses refer to the systems as defined on pp. 43-48.

———— Active systems development work in progress.

– – – – – – – Preliminary systems development work, usually in support of another system.

APPENDIX A: Methodology

The methodology used in conducting this study was the Information Systems Planning model first developed by the IBM Corporation to solve some of its own internal problems. The ISP methodology has been widely and successfully used both in the corporate world and in education and other non-profit organizations (state and local governments, universities, etc.) to improve their use of information and data processing resources.

This methodology stresses that an information systems plan must support the objectives of the school system and should be developed from the point of view and with the active participation of top management. (It should also be noted, however, that while the planning is "top-down," implementation of an information systems plan must be "bottom-up," i.e., installed from the lowest operational levels up to the highest level of general management.) The point is that information systems planning can succeed only with the understanding and commitment of the top decision makers.

The basic tenets of the ISP approach are as follows:

1. A school system should change in response to changes in its environment.

2. The success of the school system depends to a great extent on the effectiveness of management decisions.

3. The effectiveness of decisions by management is closely related to the information on which the decisions are based.

4. Optimal use of resources is the key to increased productivity.

5. Management control is the key to optimal use of resources.

6. Information systems requirements should be identified from the top-down, with design and implementation from the bottom-up.

7. Information systems must be organized around the processes of an organization, rather than around the organization. Processes reflect the activities of the school system and the organization supports the execution of these processes.

The chief purpose of this ISP study was to define ways to improve the information support of administrative decisions in the school district so that the educational program of the Tulsa Public Schools may be effectively implemented and sustained. The specific objectives of the study were:

1. To understand the school district from the point of view of its information needs.

2. To understand how data processing is currently supporting the school system.

3. To identify a network of information systems required to support the school system and its educational objectives.

4. To identify the first system to be developed.

5. To propose a plan of implementation for the first system, and for successive information systems.

To achieve these objectives, the Task Force broadened its understanding of the school system by:

1. Identifying and defining the processes essential to the activities of the school district.

2. Reviewing all current information systems.

3. Reviewing the extent of involvement of various departments in each process.

4. Verifying that involvement by a series of two-hour interviews with forty-eight key staff members.

Using the information derived from the ISP research, the Task Force completed its work by:

1. Preparing a set of matrices showing the interrelationships and dependencies between organizations, processes, systems and data classes, as shown in Appendix E.

2. Designing an information systems network with six major system groups and twenty-six systems or applications. This IS network is presented in Appendix F.

3. Determining the order in which various data systems would be recommended for implementation. This process is described in Appendix G.

4. Developing the conclusions and recommendations which are offered in Chapters III and IV.

5. Describing in Chapter V a plan for acting upon the Task Force recommendations.

APPENDIX B: Process Definitions

A process is an essential decision and activity area required to manage and administer the resources and operations of a business or school system. Processes are defined independent of the organizational structure.

The seven major processes and forty-seven sub-processes defined below were identified by the Task Force to encompass all the essential operations of the Tulsa Public Schools. These processes constituted the basis for the detailed data flow analysis portrayed in Appendix E.

PROCESS AND SUB-PROCESS	DEFINITION
I. STUDENT	Those processes that have primary focus on the student.
A. Enrollment	Collecting and approving required information for enrollment.
B. Recordkeeping	Maintaining official cumulative and attendance records.
	Maintaining auxiliary records such as health, discipline, awards, etc.
C. School Assignment	Identifying appropriate school of attendance and any transfers or reassignments.
D. Scheduling	Assigning students to the appropriate grade, course, class and level.
E. Performance Evaluation	Assessing educational progress through diagnostic and achievement testing and a system of marking and grading.
F. Student Activities	Providing services and programs apart from the formal curriculum which extend educational experiences.
G. Guidance, Counseling, and Health Services	Providing educational and vocational guidance, counseling, placement and follow-up, and referrals for assistance from psychological, health and community services.
H. Course Instruction	Presenting course materials and skill building activities.
I. Transportation	Providing bus service.
J. Security and Safety	Providing for physical protection.

PROCESS AND SUB-PROCESS	DEFINITION
II. CURRICULUM AND INSTRUCTION	Those processes that have primary focus on all programs and courses of instruction.
A. Assessment of Needs and Resources	Determining the curricular and instructional needs of students and identifying resources available to meet those needs.
B. Curriculum Development	Defining structure, sequence and requirements related to the objectives of all courses.
	Determining methods of instruction.
C. Selection of Instructional Materials	Selecting textbooks and other instructional materials appropriate to the objectives, content and structure of all courses.
D. Building Master Schedule	Determining the course offerings, the number of sections and selecting the optimum time-frame for each section to meet the needs of the students and utilize the talents of the staff.
E. Evaluation of Curriculum and Methods of Instruction	Determining the effectiveness of courses and methods of instruction in meeting the objectives of the school system.
III. PERSONNEL	Those processes that have primary focus on all employees of the school system.
A. Assessment of Needs	Determining the personnel requirements of the school system and the financial resources necessary to meet these requirements.
B. Recruiting and Hiring	Seeking qualified applicants, accepting applications, conducting interviews, evaluating applicants, determining conditions of employment, and employing selected applicants.
C. Allocation and Assignment	Authorizing the positions.
	Assigning the employee to an appropriate position.
	Assigning individual job duties.
	Developing job descriptions, classifications and qualifications for a position.
	Developing and administering staff reduction and transfer procedures.

PROCESS AND SUB-PROCESS	DEFINITION
D. Salary and Benefit Administration	Establishing acceptable wage and salary schedules for all categories of employees.
	Certifying and processing payrolls.
	Defining and administering a schedule of employee benefits.
E. Staff Development	Developing inservice training programs.
	Approving advanced study for salary adjustment.
	Establishing employee career advancement policies and procedures.
F. Performance Appraisal	Evaluating candidates for advancement.
	Establishing and periodically reviewing the performance appraisal procedures.
	Appraising employee performance periodically.
G. Employee Relations	Establishing personnel policies and procedures.
	Negotiating or communicating with various employee groups on matters concerning employee job satisfaction or general well-being.
	Administering the employee grievance procedure.
H. Termination	Determining the conditions and circumstances of dismissal or non-renewal.
	Recommending terminations.
	Administering employee appeals procedures.
	Assisting employees with necessary arrangements for retirement.
IV. FINANCE	The processes that have primary focus on procurement and management of the financial resources of the school system.
A. Analysis and Projection of Revenues	Forecasting of funds available, sources from which derived and restraints involved.
B. Income Acquisition	Obtaining maximum revenues from all available sources.

PROCESS AND SUB-PROCESS	DEFINITION
C. Budgeting	Assessing needs and allocating revenues to areas of responsibility.
D. Expending	Disbursing of designated funds.
E. Fund Management	Monitoring of expenditures in conformance with the budget.
F. Auditing	Verifying that operations are in compliance with legal mandates and that adequate internal control is practiced.
V. FACILITIES AND EQUIPMENT	Those processes that have primary focus on all major physical assets of the school system.
A. Assessment of Needs	Determining the adequacy of existing facilities and equipment and estimating future requirements.
B. Acquisition and Disposal	Obtaining and disposing of facilities and equipment.
C. Alteration and Maintenance	Modifying, maintaining and repairing facilities and equipment.
D. Inventory	Accounting for facilities and equipment on hand.
E. Plant Operations	Servicing and cleaning all physical facilities and plant equipment.
F. Security	Providing protection against loss or damage.
G. Scheduling	Controlling use of facilities and equipment.
H. Allocation of Equipment	Assigning available equipment.
VI. SUPPLIES AND SERVICES	Those processes related to the consumable goods and services required for the operation of the school system.
A. Assessment of Needs	Determining the type and quantity of goods and services needed to support school system activities.
B. Acquisition	Obtaining goods and services by soliciting bids, evaluating alternatives, selecting vendors, negotiating purchase contracts and arranging for delivery of goods or services.

PROCESS AND SUB-PROCESS	DEFINITION
C. Warehousing and Inventory	Receiving deliveries, storing, selecting for distribution and maintaining inventory of items in stock.
D. Preparation of Goods	Processing goods into a usable form (e.g., activities by graphics, food services, print shop, etc.)
E. Distribution	Distributing goods and services to sites where needed.
VII. DISTRICT MANAGEMENT	The processes of planning, administering, monitoring and communicating for the needs of the total school system.
A. System Planning	Developing goals and objectives for the school district and recommending activities and time schedules to accomplish those purposes.
B. System Management and Evaluation	Delegating and administering system-wide activities and monitoring the extent to which those activities achieve their intended purposes.
C. Policy and Procedure	Developing guidelines and procedures to carry out the policies established by the Tulsa Board of Education.
D. Implementation of Legal Requirements	Interpreting regulations of state and federal agencies and modifying policies and programs to meet those requirements.
E. Public Relations and Communications	Communicating to the public pertinent information about the school system including activities, policies and needs.

APPENDIX C: Current Systems Review

The Tulsa Public Schools' first computer was installed in 1964. As was the practice then, programs were written to serve specific, limited applications. These programs performed a vital function in the fast, accurate processing of large amounts of routine data. Among the first applications was the preparation of attendance and census reports required by the State. At about the same time, programs were written to facilitate various financial accounting and budgeting procedures. One by one, further applications were added to accommodate other user departments within the school system.

The programs developed over the years were designed to serve particular applications, with no plan for producing summary reports to support management decisions. Any combining of data from the output of the various systems had to be done manually, and such is still the case today. However, since these systems, as described below, serve many essential functions, each will need to be included in any revision of the total information system for the school district.

1. Accounts Payable: At the beginning of each fiscal year, the new budget is established by making appropriations to the various accounts. During the year, as warrants are written for material and services received, encumbrances and expenditures are charged against the appropriate funded accounts. A report is prepared for each Board of Education meeting reflecting the current status of appropriations, encumbrances and expenditures for each account.

2. Attendance: Furnishes documents for recording attendance and collects data to be used in creating a report for the State of Oklahoma of the Average Daily Attendance (ADA).

3. Bank Reconciliation: Cancels paid warrants and reflects paid and outstanding warrants.

4. Boundary Control: Reports the number of students by grade, race, etc. living within various attendance zones. Used to study effects of boundary changes and school closings.

5. Budget: An annual reporting system that provides for the budgeting of a new year's appropriations.

6. Cafeteria Accounting: Provides data needed by the Foodservices Department in the calculation of State reimbursement for cafeteria goods and services.

7. Cafeteria Cash and Milk: Produces a report of meals prepared and milk sold for which the State reimburses the Foodservices Department.

8. Cafeteria Purchasing: Maintains the cafeteria inventory and provides a list for delivering cafeteria supplies to the schools.

9. Cash Ledger: A list provided to the Treasurer's Office of monies deposited and spent.

10. Corporal Punishment: Provides periodic reports of corporal punishment administered, together with the school site, race and sex of student, and reason for punishment.

11. Credit Union: Payroll deductions for the Tulsa Teachers Credit Union are made and reported.

12. Custodial Overtime: Reflects overtime worked by custodian, by school.

13. Enrollment: Provides documents for enrolling students in schools and updates each student master record.

14. Estimated State Aid: Calculates the revenue that the Tulsa Public Schools will receive during the next fiscal year based upon the formula established by the State of Oklahoma.

15. Federal Reports: The payroll deductions for FICA, federal income taxes, state income taxes, etc. are reported on the required monthly, quarterly or annual basis.

16. Insurance: Provides the insurance companies with a report on the monies deducted from employees' pay for insurance and annuities.

17. Library Books: Provides a catalogue of library books; prints orders and distribution by school; and provides the encumbering and expending entries for accounts payable.

18. Payroll: Maintains all data on employees required by law and employment contracts concerning salaries and produces all payroll warrants. Year-to-date earnings and fund account distribution is also provided.

19. Professional Dues: Tulsa Classroom Teachers Association receives a report of the payroll deductions taken for professional dues.

20. Retirement: Monies deducted for retirement are reported to the Teachers' Retirement System of Oklahoma.

21. Salary Contract Book: A system used in maintaining, estimating and forecasting the cost of employee salaries. Annually the system produces the estimated cost of new salary schedules and bases, while updating payroll information for the new year.

22. Special Education: Produces a report of the number of special education classes of various types needed. The report is based upon records of the number of identified students, classified by type of special class recommended.

23. State Reports: Unemployment tax and workmen's compensation payments, based upon the payroll system and the average daily attendance (ADA), are reported to the State of Oklahoma via the student attendance system.

24. Statistical Analysis: A variety of statistical procedures are available for analyzing student achievement data. Results of these analyses aid in determining the effectiveness of different curricula and instructional techniques.

25. Student Master File: Keeps the master record of each student up-to-date by considering transfers, entries, gains and losses. Produces a variety of reports on both a scheduled and a request-only basis.

26. Student Scheduling: Produces class schedules for three senior highs and five junior highs based upon a master schedule provided by each school.

27. Suspensions: Provides schools with reports showing types of suspensions, number of days suspended, and a percentage comparison of each school to district average.

28. TEPAC: Makes payroll deductions of contributions to the Tulsa Education Political Action Committee.

29. Test Scoring/Item Analysis: Scores optical marked test forms and provides an item analysis of the test results.

30. Textbook: Compiles the textbook orders sent to the State of Oklahoma and a distribution schedule for warehouse delivery of the books to the schools.

31. Warehouse Catalogue and Orders: Provides a catalogue of custodial, instructional and warehouse material available.

APPENDIX D: Interviews

Interview Process:

One of the major information gathering efforts of the Task Force was the interviewing of the forty-eight key staff members listed on page 26. Prior to these interviews, the Task Force, using staff job descriptions, made a tentative assessment of the degree of involvement of each interviewee in the various processes shown in Appendix E under the "Organization/Processes" matrix. During the interviews, these tentative assessments were verified or revised and the matrix was finalized in its present form.

In addition to verifying each interviewee's involvement in the process, the Task Force sought to accomplish the following purposes during the interviews:

a. To learn from the interviewee about his job.

b. To learn what additional information needs the interviewee had.

So that the essential topics would be covered and there would be some uniformity in the data gathered during the interviews, the Task Force prepared the series of eight questions shown as Sample Form 1 on page 27. Good rapport was first established by the Superintendent with a memorandum to each interviewee on July 7, as indicated by Sample Form 2. On July 17, a meeting was held to explain the purpose of the study to those who were to be interviewed. At that time, copies of the Process Definitions listed in Appendix B were distributed so that each interviewee could assess his involvement in each sub-process. Appointment times were arranged by telephone with each interviewee, after which they were confirmed with Sample Form 3. Following each interview, a typewritten record of the interviewee's comments was returned to him for correction, together with the memorandum illustrated by Sample Form 4.

Interviewees:

The Task Force gratefully acknowledges the assistance of the following persons who so generously gave of their time for these interviews.

Dr. Larry Zenke, Superintendent of Schools
Mr. Granville Smith, Administrative Assistant to Superintendent
Dr. Paul McCloud, Assistant to Superintendent for Research, Planning and Development
Mr. Morgan Powell, Director of Public Information
Mr. Gary Watson, Director of Information Systems Services
Mr. Kenneth Bays, Associate Superintendent for Personnel Services
Mr. Robert Brewer, Assistant Superintendent for Employee Relations
Mr. Delbert Pool, Director of Certificated Personnel
Mr. Millard House, Director of Classified Personnel
Dr. John Dewell, Director of Staff Development and Human Relations
Dr. Jack Griffin, Associate Superintendent for Instruction
Mr. Roy Lewis, Administrative Assistant for Instruction
Mr. J. J. Morton, Director of Elementary Education (Area 1)
Dr. Dale Edmond, Director of Elementary Education (Area 2)
Dr. Wayne Bland, Director of Junior High Education
Mr. Donald Hoopert, Director of Senior High Education
Mr. Arnold Stock, Director of Adult Education
Mr. Phil Goodman, Director of Community Schools
Mr. Roger Kruse, Director of Federal Projects
Mr. Homer Towns, Director of Industrial/Vocational Education
Mr. Ken McCharen, Director of Instructional Media
Mr. Ed Lacy, Director of Physical Education and Athletics
Dr. Mary Joe Keatley, Director of Psychological and Testing Services
Dr. George Truka, Director of Special Education
Mr. Lewis Cleveland, Associate Superintendent for Business Services
Mr. David Willard, Assistant Superintendent for Budget and Management Information
Dr. Blaine Smith, Assistant Superintendent for Business Management
Mr. Frank McNeill, Director of Accounting
Mr. Bob McCartney, Director of Building Planning and Maintenance
Mr. Johnson Lee, Coordinator of Facilities Utilization
Miss Mary Harris, Director of Foodservices
Mr. Malcolm Craig, Director of Purchasing
Mr. Howard Fink, Director of Transportation and Plant Operation
Mr. Ellsworth Hales, Director of Attendance and Census
Dr. Leonard Kishner, Director of Health Services
Mr. Curtis Glassco, Director of Pupil Accounting
Mr. David Fist, Attorney
Mr. Ken Johnson, Partner, Hurdman and Cranstoun, External Auditors
Mr. Dean Wilson, Internal Auditor
Mr. Clarence Brown, Treasurer
Dr. Vernon Jackson, Elementary Principal
Mr. Jack Pontious, Junior High Principal
Dr. James Darland, Senior High Principal
Mrs. Rosa Belle Hess, Supervisor of Elementary Education
Mrs. Barbara Creekmore, Elementary Teacher
Ms. Carla Lund, Senior High Teacher
Ms. Odetta Lewis, Senior High Counselor
Mrs. Donna Hemphill, School Clerk and Office Manager

Sample Form 1:

Suggested areas to be discussed in Information Systems Task Force interviews:

1. Briefly, what is your area of responsibility?

2. What are your objectives within your area of assigned responsibility?

3. What major problems do you have that make your job overly difficult or take an inordinate amount of time? What do you need to solve or alleviate these problems?

4. Are there certain types of information that would help you solve or alleviate these problems?

   a. What would the availability of this information mean to you? In terms of tangible cost benefits? In terms of intangible benefits, for example, improved decisions, improved employee morale, etc.?

   b. Can you set priorities on the information needs of your department?

5. How do you interface with other entities in the school system? (Whom do you get information from and to whom do you send information?)

6. What major changes will your department need to make in the next two to five years to adequately respond to changing conditions? What new types of information will these changes require?

7. Can you comment in a general way with respect to information that you now receive or that you would like to have?

8. Do you have any other comments about the information flow within the Tulsa Public School System?

Sample Form 2:

TO: Wayne Bland

FROM: Larry L. Zenke LLZ

DATE: July 7, 1978

SUBJECT: Information Systems Planning Study

I am sure you are aware of the dynamic nature of our school system. Our success in the future will depend greatly on how we plan and react to this changing environment. I am pleased to inform you that we are initiating a major effort to analyze our current and future information needs. I have appointed a task force to conduct an in-depth study of how we use information and its relation to our school system.

The task force will be directed by Dr. Paul McCloud, with a cross-section of other school personnel involved on both a full-time and part-time basis. Assisting us in an advisory capacity will be personnel from the IBM Corporation. We will be using a methodology called Information Systems Planning (ISP), which has been helpful to other school systems and businesses in evaluating and planning their information requirements.

The key to the study's success is to make certain our individual and collective information needs are well identified and clearly stated. To this end, the task force will want to meet with us to discuss our information needs in detail through a series of individual interviews. It is essential that each individual who is asked to participate in an interview be completely candid in discussing problems, needs, and plans with the team members. The members of the task force pledge that all information given in these interviews will be treated professionally and only their final recommendations will be discussed outside the group. You will be contacted by Dr. McCloud in the near future to set up interview dates and times. I urge you to give full cooperation in this valuable enterprise and to work as closely and cooperatively with the task force as possible.

You are asked to attend an orientation meeting with the task force at 11:00 a.m. on Monday, July 17 in the Reception Room. I am confident the study will be of tremendous value to the Tulsa Public Schools and will help us to accomplish our overall objectives.

LLZ:dm

Sample Form 3:

TO:

DATE:

SUBJECT: Information Systems Planning Study

Dr. Zenke's memorandum of July 7, 1978, announced the initiation of an in-depth information systems planning study for our school system. The objectives of the task force are to:

- Develop an overall understanding of the operations of the school system
- Understand how data processing currently supports these operations
- Identify a gross network of information systems that will support the operations of our schools
- Identify the first or most needed subsystems within the network
- Make recommendations for improvements
- Develop an action plan

To assist the task force in this effort, we plan to interview all executive and general staff members and other key personnel of our school system. We anticipate that each interview could take as much as two hours. As you agreed by telephone, we have set , July , at , for your meeting with the task force. The meeting will be in room in the Education Service Center. Please bring to the meeting any records or sample reports which might be helpful. If you desire, you may also invite other members of your staff to join you in the interview.

The purpose of the meeting is for us to learn about your area of responsibility, the information you consider essential to manage your area, and the problems you currently have in obtaining this needed information. The discussion of these topics will enable us to better understand your information needs, to evaluate the current information systems, and to define systems that are responsive to your information needs.

We hope you welcome this opportunity, as we do, to share our mutual concerns about the need of our school system for accurate, complete and timely information. If you have any questions, please call me. Thank you for your cooperation.

Sincerely,

Paul I. McCloud

Paul I. McCloud
ISP Task Force Leader

PIM/mrs

Form ES-11

INDEPENDENT SCHOOL DISTRICT NO. 1
TULSA COUNTY, OKLAHOMA

FOR INTER-OFFICE AND INTER-SCHOOL CORRESPONDENCE

Sample Form 4:

To Dr. John Dewell

From Wayne Bland, Interviewer

Date August 3, 1978

Attached is a transcript of the notes taken by the Information Systems Task Force recorders during your interview. Will you please check them, make any corrections, additions or deletions you wish and return them to Research, Planning and Development within the next few days.

We very much appreciate your cooperation and help.

WB:bjb
Enc.

Interview Findings:

PROBLEM	IMPACT	NEED/RECOMMENDATION	VALUE/BENEFIT
	Findings Related to GENERAL Processes		
A. Lack of adequate flow of information for making many internal decisions, in spite of large quantities of generated data.	Time-consuming effort on the part of many employees to obtain needed information. Much duplication of effort. Lack of confidence in administrative decisions.	Develop and implement an integrated information systems network addressable by all concerned users.	Less time spent on data acquisition. Reduction of duplication of efforts. Improved confidence in administrative decisions. Better justification for decisions, which will improve administrative/faculty/community relationships.
B. Much manual processing of data. Some manual systems, though slow, are quite efficient.	Delays in obtaining information and generating reports. Questionable accuracy of some data.	Examine manual systems to determine which ones should be continued and which ones computerized.	Faster access to data. Potential cost savings. Enhanced confidence in computerized data.
	I. Findings Related to STUDENT Processes		
A. Inaccessibility of complete data on individual students. Student data is scattered on many computer files and manual records. Some student data is not yet on the computer; i.e., standardized test scores, special placement.	To retrieve information in an integrated form requires an inordinate amount of time. In many cases data is inconsistent and inaccurate. The present reporting form lacks flexibility for making ad hoc reports.	Develop and implement an integrated student data base.	Increased efficiency in performing all services for which student information is required. Improved reporting and analysis capability for state, federal and accrediting reports. Improved accuracy of student data. Saving of time in obtaining needed student information. More adequate public information. More adequate follow-up information on former students.
	II. Findings Related to CURRICULUM AND INSTRUCTION Processes		
A. Limited data processing capability to support master scheduling.	Inordinate time consumption for administrative and classified personnel. Great potential for error.	Develop and implement processes for: space and room utilization in real time; building schedule based on student needs; on-going adjustments of student schedules as needed.	Improved quality of schedule. More efficient process. Better space utilization. Better information to the public. More responsive to student needs.
B. Inadequate information for curriculum planning, development and evaluation. Frequent determination of curriculum priorities without appropriate data. Lack of data on comprehensive community program needs for curriculum planning. Lack of systematic information for evaluating curricula.	Potential misdirection of resources in curriculum development. Curriculum development based on limited plans and data.	Establish improved organizational and informational capability to identify curriculum needs and to develop and implement programs.	Improvement in use of resources to achieve curriculum objectives of the school district. Better utilization of teaching staff.
C. Lack of Computer Assisted Instruction (CAI) and Computer Managed Instruction (CMI).	Students do not get adequate reinforcement of basic skills. Manual records of individual pupils' progress are inadequate.	Implement CAI and CMI in a few pilot schools, then expand as deemed feasible.	Improved individualization of instruction. Improved motivation of students. Improved mastery of basic skills.

PROBLEM	IMPACT	NEED/RECOMMENDATION	VALUE/BENEFIT
D. Lack of computer support for educational and career guidance functions.	Inordinate time consumption for counselors in providing educational and career information.	Provide equipment and automated programs to furnish such information for students.	Enhancement of information services of guidance and counseling. Improved educational and career planning capabilities for students. Saving of time of counselors for individualizing guidance and counseling services.
E. Lack of computer support for scoring standardized tests.	Great expense of commercial scoring of standardized tests. Limited use of test scores for curriculum planning and individualizing instruction.	Develop and implement program to score standardized tests and record data on computerized student records.	Better assessment of student needs for curriculum planning and individualized instruction. Improved utilization of test scores in guidance and counseling. Saving of money in scoring tests.
F. Insufficient relating of budgets to programs.	Uncertainty of budget support of programs.	Provide improved coordination between curriculum and budgeting processes.	Improved support for priority programs.
	III. Findings Related to PERSONNEL Processes		
A. Inaccessibility of complete data on individual employees. Limited automation in processing personnel records.	To retrieve information in an integrated fashion requires an inordinate amount of time. To search and maintain manual records is time-consuming and subject to error.	Develop and implement an integrated personnel data base.	Increased efficiency in performing all services for which personnel information is required. More efficient staffing and reporting for government and accrediting reports.
B. Present computer equipment and systems have reached their limits in processing payrolls. Much hand processing is required.	Time-consuming. Errors and delays. Inefficient use of manpower. Salary deduction service not available to some groups.	Update data processing equipment and payroll systems.	More accurate, efficient payroll transactions.
	IV. Findings Related to FINANCE Processes		
A. Limited accessibility to integrated financial data. Inadequate data processing support for forecasting, budgeting and analyzing district funds. Limited capacity for providing information for writing proposals for federal funds. Lack of timely, accurate and concise reporting of the financial status of the school district, monthly and annually. Little capacity for reporting the cost of operation in individual schools, instructional programs and transportation.	Potential loss of funds. Potential inaccuracies in revenue projections. Time consumed in manual revenue projection procedures. Ineffective budget monitoring. Limited access to budget information for users. Inconsistency in allocation of funds within the district budget. Difficult and time-consuming process of manually analyzing district funds and of obtaining information for writing proposals for federal funds. Lack of financial assurances. Limited capacity for determining economy of operations.	Develop and implement an integrated financial data base with capabilities for budget, projection and analysis procedures.	Better access to information for those involved in forecasting, budgeting and analyzing district funds. Better use of the budget for financial control, monitoring and planning. More consistent allocation and reallocation of funds. Better management in the use of budgeted resources. Improved capabilities for federal and state reporting requirements. Improved accountability to Board of Education, state law and the public for management of funds. Improved support for external auditing. Increased confidence that district, state and federal funds are used wisely and in accordance with priorities. Improved information for reduction of costs of operations.

PROBLEM	IMPACT	NEED/RECOMMENDATION	VALUE/BENEFIT
B. Inadequate data processing support to revise accounting procedures to comply with state and federal requirements.	Inability to meet July, 1979 deadline mandated by government.	Develop and implement automated accounting system compatible with State Accounting Handbook II.	Better processing of accounts payable and receivable; improved capabilities for audit.
C. Manual processing of student activity funds.	Time-consuming process; potential for error.	Develop automated programs for bookkeeping and auditing of student activity funds.	More efficient management of student activity funds. Saving of time.
V. Findings Related to FACILITIES AND EQUIPMENT Processes			
A. Lack of data processing support of inventories of buildings, equipment and supplies.	Time-consuming manual processing. Duplication of efforts. Inefficiency in allocating equipment and supplies. Potential for theft.	Establish automated inventory system.	Greater utilization of existing resources with more timely and comprehensive information on facilities. Reduce likelihood of theft.
B. Lack of statistical data on buildings and sites.	Limited information for determining cost of operating and maintaining buildings and sites.	Develop and implement a facilities and equipment data base.	Provision of timely and accurate information for maintaining facilities. Potential reduction of costs of maintaining buildings and sites. Identification of cost ineffective buildings.
C. Lack of computerized scheduling of facilities, services and equipment such as buses, instructional media, maintenance services and buildings.	Time-consuming manual scheduling. Inefficient use of facilities, equipment and personnel.	Develop and implement a computerized scheduling program.	More efficient use of facilities and equipment. Saving in processing costs. Better utilization of craftsmen.
VI. Findings Related to SUPPLIES AND SERVICES Processes			
A. Limited data processing support of system-wide supply inventories such as curriculum materials, textbooks, instructional media software, food supplies, custodial supplies and industrial arts materials.	Time-consuming manual process. Inefficient use of goods and services. Delay in processing books and supplies and putting them into use.	Develop automated procedures for keeping track of goods and supplies.	More efficient use of goods and supplies. Greater planning capabilities. Greater student and teacher satisfaction. Less chance of items in inventory becoming outdated.
B. Lack of data processing support of scheduling of instructional media software.	Time-consuming manual scheduling. Inefficient use of instructional media resources.	Develop computerized bookings of instructional media software.	Saving man-hours. More efficient and satisfactory use of instructional media resources.
C. Lack of data processing support of food services. Assessment of needs. Ordering. Inventory. Purchasing. Reports to state and federal governments. Accounting and recordkeeping. Personnel records.	Inordinate paperwork burden. Delays in managerial reports. Time-consuming and expensive manual accounting and recordkeeping procedures. Inability to analyze cost of operations. Imbalance in cost of labor and food.	Develop and implement automated support for food service procedures with capabilities for cost accounting.	More efficient management of food services. Better balance between cost of labor and cost of food. Improved capabilities for fulfilling state and federal reporting requirements. More timely reports on money available from school district. More efficient assessment of needs and planning for change to centralized food preparation.

PROBLEM	IMPACT	NEED/RECOMMENDATION	VALUE/BENEFIT
D. Slow verification of receipt of materials.	Loss of discounts available for prompt payment. Reluctance of vendors to bid again because of late payments.	Develop automated procedure to secure verifications from departments.	Better prices from vendors.
E. Manual processing of requisitions.	Costly and time-consuming process. Costs $7 to $8 per requisition to process.	Review present approval process. Develop and implement an automated system of processing requisitions.	Reduction in processing costs. Faster processing of requisitions. Better coordination with budget.
	VII. Findings Related to DISTRICT MANAGEMENT Processes		
A. Limited data processing support for district-wide planning and decision-making and for answering questions of the public and news media.	Limited information to public means potential loss of support. Lack of confidence in administration of the schools. Limited ability to respond to ad hoc requests for information. Conflicting information is sometimes released from two or more departments. Inadequate information about the school system is available to district staff, students and parents. Unavailable information delays planning, decision-making and reporting.	Develop and implement integrated data bases serving all departments.	Better information for management, operations, planning, evaluation and decision-making activities. Increased credibility with the public. Increased trust within the school system. Increased accountability in many district processes. Accurate and timely information for better use of district funds and assistance in generation of new funds. Greater ability to assess actual program effectiveness.
B. Inadequate data processing support for monitoring impact of proposed legislation on this school district.	Difficulty of keeping up with large number of bills generated by legislature that affect school district means potential loss of funds and potential failure to comply with law.	Develop computerized service for monitoring state and federal legislation affecting schools.	Better planning and forecasting. Better capabilities for defining legal obligations of the school district. Improved ability to take advantage of funding opportunities. Capabilities for examining hypothetical questions to determine whether legal proposals are favorable to district. Increased ability to influence proposed legislation before it is passed.
	Findings Related to INFORMATION SYSTEMS SERVICES DEPARTMENT		
A. Understaffed, though competent, data processing staff.	Limited data processing services because of small staff. Difficulty of hiring additional competent personnel at present pay scale and outdated computer technology.	Examine salaries of computer personnel with the view of making them more compatible with similar positions in industry. Hire additional personnel as needed for expanded services.	More adequate staff for proposed expansion of data processing system.
B. Outmoded present computer equipment, incapable of meeting the information needs of the school district.	Inability to serve the information needs of the users.	Plan and purchase or lease computer equipment and software to meet expanding needs for information in the school district.	Improved information output and better use of district resources.

PROBLEM	IMPACT	NEED/RECOMMENDATION	VALUE/BENEFIT
C. Lack of integration of data to support management, operational, planning, evaluation and instructional activities.	Inability of various data files to cross organizational and functional lines. Limited ability to summarize and interpret information stored in numerous files. Inadequate supportive information for many operational decisions. Necessity of extensive manual effort to collect and maintain various data files. Many redundant files, sometimes with conflicting data.	Develop and implement an integrated data base and supportive information system that sustains the information needs of the school district.	Improved confidence in the accuracy of information. Information more meaningful, consistent, timely, accessible. Improved quality of decision-making. Improved utilization of resources. Enhanced opportunity to improve program in terms of achieving desired outputs with the least possible consumption of required inputs.
D. Underutilization of computer in some cases and overutilization in others because of a general lack of awareness of potential uses of the computer.	Ineffective and non-creative use of the computer as a resource in support of the business and instructional functions of the school district, causing: severe workload for computer personnel; data inaccuracy and untimeliness; an inability to forecast effectively; inefficient uses of administrative and teaching time; underutilization of an investment.	Develop and implement an information system network encompassing all the necessary systems.	Increased accountability in many processes of the school district. Better use of existing and new information for decision-making. Better use of resources spent for data processing.
E. Lack of an overall philosophy of data processing and failure to follow a recognized plan for development and implementation of an information system.	Operation of data processing without adequate determination of priorities: operation in "crisis." Unclear division of priorities among administrative, operational and instructional computer needs.	Establish priorities, guidelines and an accountability system to insure that data processing resources serve the district needs.	Ability to meet priority needs of district. Better use of data processing resources. More equitable allotment of computer time among administration, operations and instruction.
F. Lack of insurance on data processing programs and files and doubtful security of computer room.	Danger of loss by theft or natural hazard of computer records as well as backup records and little capacity for sustaining the financial loss or continuing essential school district operations.	Seek and install appropriate fire and theft protection devices for computer programs and backup records. Seek and purchase appropriate insurance for computer programs.	Minimal probability of loss of programs and files and financial capability to rebuild them if loss occurs.

APPENDIX E: Analysis of Information Systems Needs

The matrices shown on the following pages represent the four quadrants of the total information systems matrix for the Tulsa Public Schools. (Because of its size, the full matrix could not be depicted herein. However, the format of the matrix is shown by Figure Ib in Appendix F.) Collectively, these provide a visual description of the school district relationships which are to be followed in the development of a more adequate data processing capability for the school district. The components of this planned systems structure are described below.

1. Organization/Processes Matrix. This quadrant portrays "activity management," which is the conjunction of processes and organizational units within the school district. It illustrates the assignment of responsibilities within the organization to accomplish the activities and make the decisions underlying the processes required for achievement of the school district objectives. Information for this quadrant was developed by the Task Force and verified through the interview process described in Appendix D.

2. Organization/Data Classes Matrix. In this quadrant, "data management" is illustrated by the relationship of organizational units to the data classes. This matrix shows which units within the organization are currently responsible for putting data into the system and which ones are users of data from the system. Information for this quadrant was developed by the Director of Information Systems Services and verified by the Task Force.

3. Systems/Data Classes Matrix. This is the "data processing" quadrant which depicts the interrelationship of data classes and information systems. To authenticate this matrix, data requirements for each information system were determined by the Task Force.

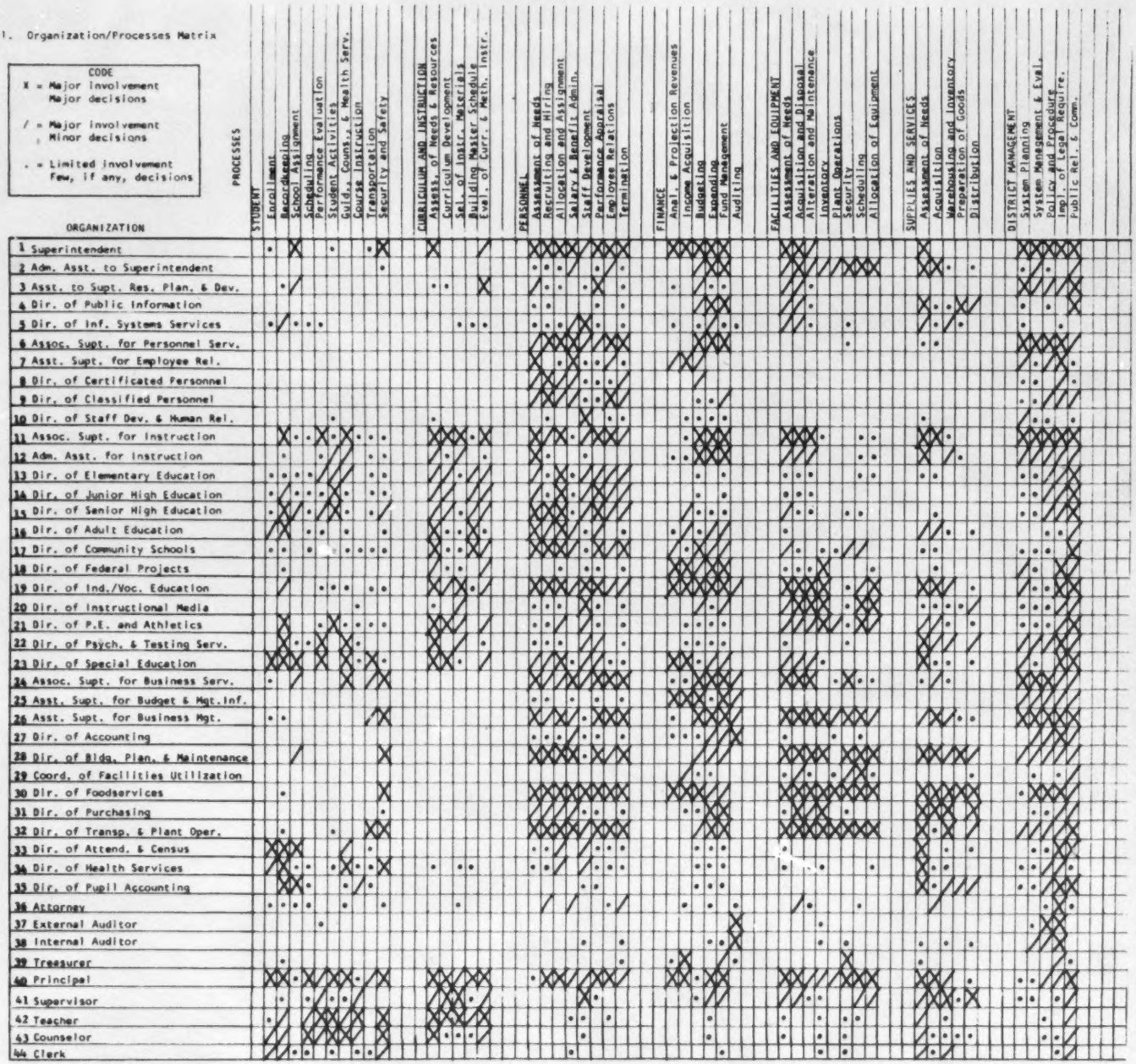
4. Systems/Processes Matrix. Characterized as the "information management" quadrant, this shows the conjunction of information systems and school district processes. Data is retrieved from the various systems and synthesized into meaningful information to support the performance of the processes by the school district.

1. Organization/Processes Matrix

CODE
X = Major involvement
Major decisions

/ = Major involvement
Minor decisions

. = Limited involvement
Few, if any, decisions



2. Organization/Data Classes Matrix

CODE
I = Inputs data to system
O = Output information user
I/O = Inputs data and uses output

DATA CLASSES

STUDENT
Master
Suspensions
Corporal Punishment
Scheduling
Transfers
Attendance

FINANCE
Accounts Payable
Encumbrance
Appropriations
Payroll Master
Payroll Detail Transactions
Cafeteria General Ledger
Cafeteria Cash and Milk
Warrant Master
Vendor Master
Budget
Cash Ledger
Chart of Accounts
Estimated State Aid

PERSONNEL
Salary Contract Book
Special Assignments
Emp. Telephone Directory

FACILITIES AND EQUIPMENT
School Address
Boundary Control
School Boundary

MATERIALS AND SUPPLIES
Textbook Master
Library Books
Warehouse Inventory
Warehouse Catalog

CURRICULUM
Math Test

MANAGEMENT
Research

ORGANIZATION	STUDENT	Master	Suspensions	Corporal Punishment	Scheduling	Transfers	Attendance	FINANCE	Accounts Payable	Encumbrance	Appropriations	Payroll Master	Payroll Detail Transactions	Cafeteria General Ledger	Cafeteria Cash and Milk	Warrant Master	Vendor Master	Budget	Cash Ledger	Chart of Accounts	Estimated State Aid	PERSONNEL	Salary Contract Book	Special Assignments	Emp. Telephone Directory	FACILITIES AND EQUIPMENT	School Address	Boundary Control	School Boundary	MATERIALS AND SUPPLIES	Textbook Master	Library Books	Warehouse Inventory	Warehouse Catalog	CURRICULUM	Math Test	MANAGEMENT	Research
1 Superintendent																																					
2 Adm. Asst. to Superintendent																																					
3 Asst. to Supt. Res. Plan. & Dev.		O																								O	O	O								O	
4 Dir. of Public Information																																					
5 Dir. of Inf. Systems Services																																					
6 Assoc. Supt. for Personnel Serv.												O											O		I/O												
7 Asst. Supt. for Employee Rel.																							I/O		I												
8 Dir. of Certificated Personnel																																					
9 Dir. of Classified Personnel																																					
10 Dir. of Staff Dev. & Human Rel.																																					
11 Assoc. Supt. for Instruction		O																												I/O							
12 Adm. Asst. for Instruction																																					
13 Dir. of Elementary Education																																					
14 Dir. of Junior High Education																							I														
15 Dir. of Senior High Education																							I/O														
16 Dir. of Adult Education																																					
17 Dir. of Community Schools																																					
18 Dir. of Federal Projects																						O														
19 Dir. of Ind./Voc. Education																																					
20 Dir. of Instructional Media																																					
21 Dir. of P.E. and Athletics																																					
22 Dir. of Psych. & Testing Serv.																																					
23 Dir. of Special Education		O																																			
24 Assoc. Supt. for Business Serv.																																					
25 Asst. Supt. for Budget & Mgt.Inf.									O	O	I/O					O		I/O		I/O		O															
26 Asst. Supt. for Business Mgt.																																					
27 Dir. of Accounting									I/O	I/O	I/O	I/O	I/O			I/O	I/O			I/O		I/O															
28 Dir. of Bldg. Plan. & Maintenance																																					
29 Coord. of Facilities Utilization																																					
30 Dir. of Foodservices														I/O	I/O																						
31 Dir. of Purchasing																														I/O		I/O	I/O	I/O			
32 Dir. of Transp. & Plant Oper.													I									I/O															
33 Dir. of Attend. & Census		I/O				I/O																				I/O	I/O	I/O									
34 Dir. of Health Services																																					
35 Dir. of Pupil Accounting		I/O	I/O		I/O																																
36 Attorney																											O										
37 External Auditor																																					
38 Internal Auditor																																					
39 Treasurer															I/O			I/O																			
40 Principal				I/O																																	
41 Supervisor																																		I/O			
42 Teacher																																					
43 Counselor																																					
44 Clerk																																					

3. Systems/Data Classes Matrix

CODE
C = Data is created by the system
U = Data is updated by the system
A = System accesses the data for reporting or processing
X = System creates, updates and accesses the data

SYSTEMS	STUDENT Master	Suspensions	Corporal Punishment	Scheduling	Transfers	Attendance	FINANCE Accounts Payable	Encumbrance	Appropriations	Payroll Master	Payroll Detail Transactions	Cafeteria General Ledger	Cafeteria Cash and Milk	Warrant Master	Vendor Master	Budget	Cash Ledger	Chart of Accounts	Estimated State Aid	PERSONNEL Salary Contract Book	Special Assignments	Emp. Telephone Directory	FACILITIES AND EQUIPMENT School Address	Boundary Control	School Boundary	MATERIALS AND SUPPLIES Textbook Master	Library Books	Warehouse Inventory	Warehouse Catalog	CURRICULUM Math Test	MANAGEMENT Research
1 Accounts Payable							X	X	X		C		U A		X		X														
2 Bank Reconciliation													U A																		
3 Payroll										X	X		U A		A					U											
4 Cafeteria Accounting							A					X	X																		
5 Cafeteria Purchasing												X																X			
6 Estimated State Aid																		C A													
7 Insurance									U A																						
8 Tulsa Educ. Political Action Com.									U	A																					
9 Credit Union									U	A																					
10 Retirement									U	A																					
11 Professional Dues									U	A																					
12 Custodial Overtime										A																					
13 Budget								X								C X														
14 Payroll-Federal Reports									A																						
15 State Reports									A											X											
16 Cash Ledger																	X														
17 Cafeteria Cash and Milk												U	X																		
18 Student Scheduling	A			X																				A							
19 Attendance	U A					C A																	X								
20 Enrollment	U A																							A							
21 Student Transfers				X																			A								
22 Student Master File Maintenance	X			A	U	U																		X							
23 Special Education	X																							A							
24 Corporal Punishment			X																				A								
25 Suspensions		X																					A								
26 Boundary Control	A					A																	A	C	A						
27 Salary Contract Book									U A											X	X		A								
28 Telephone Directory																					X										
29 Research	A																						A	A							
30 Textbook Orders																							A			X					
31 Library Books															A								A				X				
32 Warehouse Catalog & Orders																												X			
33 Test Scoring & Item Analysis																													C A		
34 Statistical Analysis																														X	
35																															
36																															
37																															
38																															
39																															
40																															
41																															
42																															
43																															

4. Systems/Processes Matrix

CODE

X = System required to support that process

SYSTEMS	PROCESSES: STUDENT	Enrollment	Recordkeeping	School Assignment	Scheduling	Performance Evaluation	Student Activities	Guid., Couns., & Health Serv.	Course Instruction	Transportation	Security and Safety	CURRICULUM AND INSTRUCTION	Assess. of Needs & Resources	Curriculum Development	Sel. of Instr. Materials	Building Master Schedule	Eval. of Curr. & Meth. Instr.	PERSONNEL	Assessment of Needs	Recruiting and Hiring	Allocation and Assignment	Salary & Benefit Admin.	Staff Development	Performance Appraisal	Employee Relations	Termination	FINANCE	Anal. & Projection Revenues	Income Acquisition	Budgeting	Expending	Fund Management	Auditing	FACILITIES AND EQUIPMENT	Assessment of Needs	Acquisition and Disposal	Alteration and Maintenance	Inventory	Plant Operations	Security	Scheduling	Allocation of Equipment	SUPPLIES AND SERVICES	Assessment of Needs	Acquisition	Warehousing and Inventory	Preparation of Goods	Distribution	DISTRICT MANAGEMENT	System Planning	System Management & Eval.	Policy and Procedure	Impl. of Legal Require.	Public Rel. & Comm.
1 Accounts Payable																													X	X	X																									
2 Bank Reconciliation																													X	X	X																									
3 Payroll																					X																																							
4 Cafeteria Accounting																														X	X					X																			
5 Cafeteria Purchasing																																													X	X	X		X									
6 Estimated State Aid																												X	X																											
7 Insurance																					X																																						
8 Tulsa Educ. Political Action Com.																					X																																				
9 Credit Union																					X																																				
10 Retirement																					X																																				
11 Professional Dues																					X																																				
12 Custodial Overtime																							X																																		
13 Budget																														X																											
14 Payroll-Federal Reports																					X																																				
15 State Reports		X																		X																																					
16 Cash Ledger																															X	X																									
17 Cafeteria Cash and Milk																																													X	X	X		X									
18 Student Scheduling				X												X																																								
19 Attendance		X	X	X																								X																													
20 Enrollment		X	X	X																																																				
21 Student Transfers			X	X																																																				
22 Student Master File Maintenance		X	X	X	X	X																																																	
23 Special Education			X																																																					
24 Corporal Punishment			X																																																				
25 Suspensions			X																																																				
26 Boundary Control				X																																																			
27 Salary Contract Book																			X		X																																				
28 Telephone Directory																							X																																	
29 Research		X																																																				
30 Textbook Orders																														X	X																X	X		X							
31 Library Books																														X	X																X	X		X							
32 Warehouse Catalog & Orders																																														X									
33 Test Scoring & Item Analysis						X							X	X		X																																								
34 Statistical Analysis						X							X	X		X																																								
35																																																							
36																																																							
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APPENDIX F: Information Systems Network

School District Data Structure:

The inadequacies of the present school district data structure are portrayed in Figure 1a. Because each data file is built to support a single application, there are numerous redundancies and inconsistencies in the data. Output from the various applications programs must be combined or compared manually. This results in only limited information support, particularly to top management, for school district operations.

A much more efficient data support system is proposed in Figure 1b. Here discrete data is fed into the system by the organizational units responsible for the various data bases. Data is then drawn from the integrated bases to produce the needed reports. School district operations are fully supported by complete, current, consistent information, compiled and reported in the format desired by the administrator.

Proposed Network:

Finally, as a critical element in this study, the Task Force developed the Information Systems Network proposed in Figure 2. This network consists of six major systems groups, all supporting school district decision-making. Five of the groups, encompassing twenty-two systems, are displayed around the outer circle of the model. At the center of the network is the Management Information group which serves the over-all district information needs. This is to be a fully integrated network, with no redundancies in data and with all data available for use in any of the twenty-six systems.

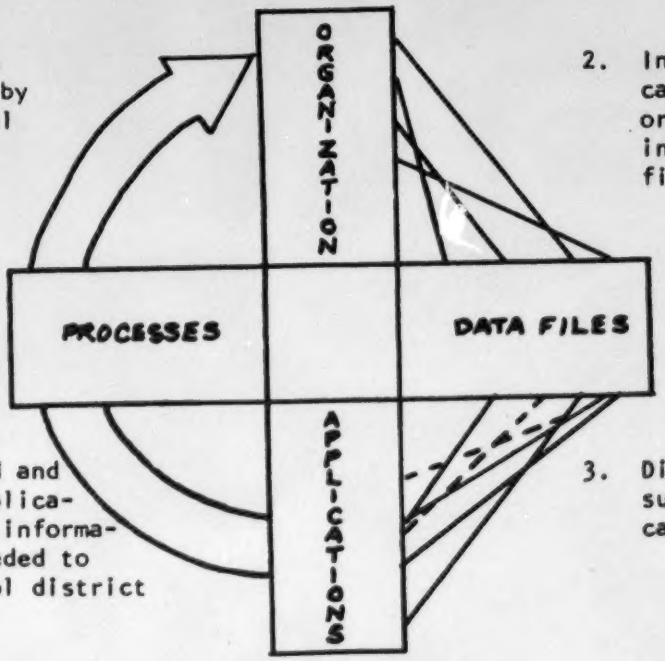
The network illustrated in Figure 2 has been designed to support the activities of the school system and to act as a guide to systems development tasks. Adherence to this network and to the ACTION PLAN recommended in Chapter V will be essential if data processing services are to effectively support information flow to the total school system.

FIGURE 1a

PRESENT SCHOOL DISTRICT DATA STRUCTURE

1. Processes are accomplished by organizational units.

2. Inadequate and duplicative data flows from organizational units into unrelated data files.



4. Uncoordinated and dispersed applications impede information flow needed to support school district processes.

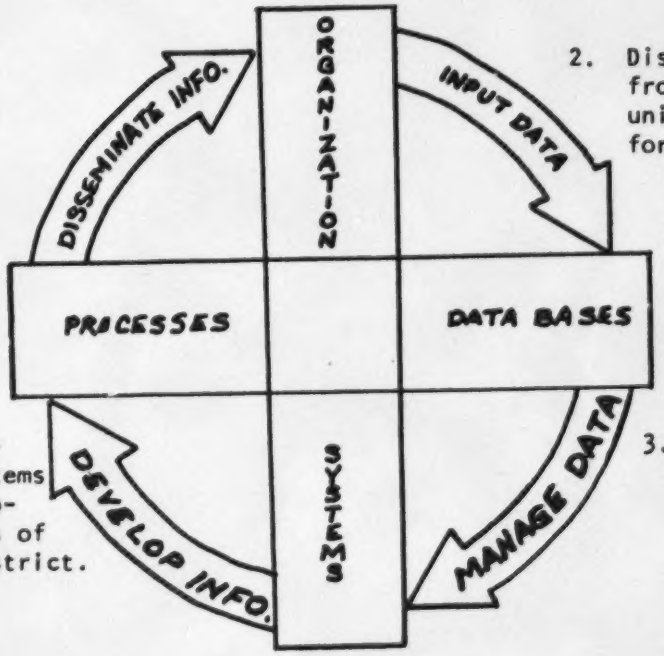
3. Disjointed data files support current applications.

FIGURE 1b

PLANNED SCHOOL DISTRICT DATA STRUCTURE

1. Processes are maintained by organizational units.

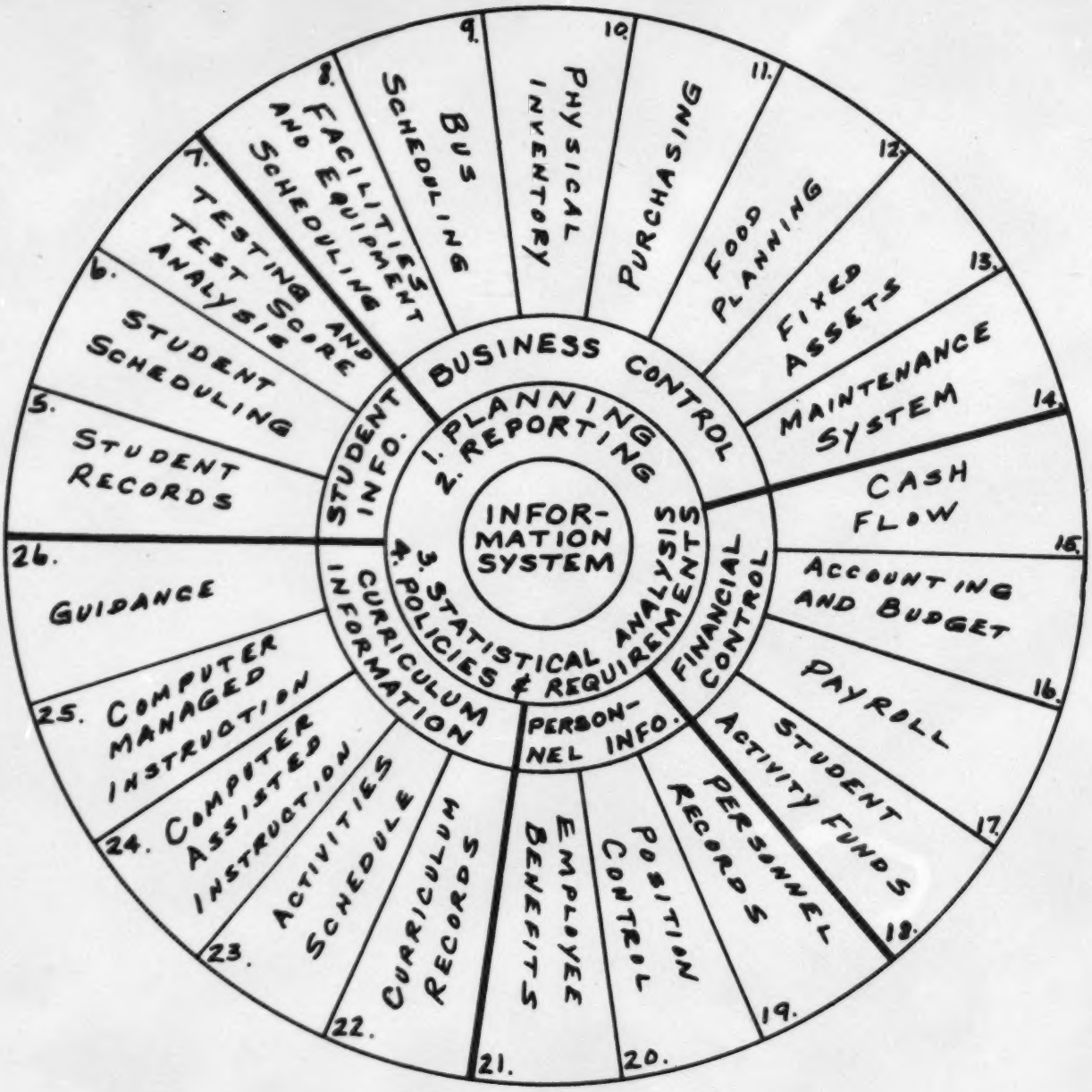
2. Discrete data flows from organizational units responsible for data bases.



4. Integrated information systems adequately support processes of the school district.

3. Integrated data is organized to support information systems.

FIGURE 2



INFORMATION SYSTEMS NETWORK

Information Systems Definitions:

The INFORMATION SYSTEMS NETWORK shown in Figure 2 depicts an integrated data base. Integration of the twenty-six systems from the six systems groups is essential so that (a) consistent, nonredundant data will be readily available, and (b) data can be retrieved from any or all of the various systems for use in formulating whatever information reports are needed. These systems are defined below.

A. MANAGEMENT INFORMATION Group

The systems in this group will draw data from the entire data base to produce information required by top management. Data will usually be presented in summary form to facilitate decision making at the district level.

1. Planning and Reporting. Based upon current and prior years' data, periodic reviews should be conducted of school district operations. Accomplishments and/or trends can be measured by test scores, attendance records, per pupil expenditures, energy costs, etc. These data can then be extrapolated to plan for future school district needs.

2. Ad Hoc Reporting. The ability to report to district management, the Board of Education, regulatory agencies and the public information that, for the most part, is unscheduled and unanticipated can be very time consuming if not impossible. However, with the flexibility of an integrated data base, such on-the-spot requests become manageable.

3. Statistical Analysis. Numerous types of statistical analyses can significantly enhance administrators' decision-making capabilities. A few examples are studies of correlation, including cause and effect relationships; cost comparisons and cost effectiveness studies; program evaluations, including hypothesis testing using inferential statistics; regression analyses and other prediction studies; and modeling studies to test alternatives and answer "what if" questions.

4. Policies, Procedures and Legal Requirements. A process or technique referred to as "text-editing" can be accomplished via data processing. This makes it possible to create, index, maintain and update all policy and procedure manuals and provide easy reference to legal questions encountered in the daily operations of the school district.

B. STUDENT INFORMATION Group

This group of systems will meet the state legal requirements for keeping attendance, recording individual student data and measuring student accomplishment, both individually and for the total district.

5. Student Records. The major system of application in this group, and the foundation of the other systems, is the master information on each student, both active and inactive, until the age of 21. Among data recorded for each student is all information required by the state, in addition to test scores, health and behavior records, and any other factual information which would be useful in supporting the education of students. From this basic file, counts can be made of students by race, sex, age, grade, school, place of residence, whether transported, handicapping condition, etc.

6. Student Scheduling. This system will provide the administrative support required by secondary schools in building a master schedule of course offerings and assigning students to classes. Copies of student schedules will be provided to individual students and all offices in the building needing them. Constant updating of student schedules will also make possible the reporting and recording of grades at the end of each quarter.

7. Testing and Test Score Analysis. The scoring and evaluation of standardized tests will be available, with detailed reports of data by school, grade, teacher, subject and in summary, for the general supervision of the instructional program. Test scores will also be available for the diagnosis of student deficiencies, especially in Computer Managed Instruction (CMI).

C. BUSINESS CONTROL Group

The common thread which unites the systems in this group is general support of operational functions. The main assets are materials, buildings and equipment. To manage effectively, an administrator must have an organized process of acquiring, inventorying, evaluating, depreciating and disposing of assets. These systems will provide the information for efficient management of these resources and for reduction of the considerable sums of money now invested in fixed assets to support the programs of instruction.

8. Facility and Equipment Scheduling. A considerable increase in efficiency can be achieved by the computerized scheduling of buildings, athletic facilities, instructional equipment, and the services of support personnel.

9. Bus Scheduling. The computerized scheduling of bus routes should both improve services to students and reduce costs in this growing area of operations.

10. Physical Inventory. The maintenance of an accurate inventory of all material and equipment throughout the district can reduce losses by theft, deterioration and obsolescence, facilitate utilization and reduce the large investment in excessive stock inventories.

11. Purchasing. A reduction in the duplication of paper work can be accomplished with a purchasing system tied directly to the Physical Inventory and Accounting systems. The verification of goods received for the purpose of proper payment can be greatly streamlined through this system.

12. Food Planning. The provision of hot meals for students requires extensive planning and careful documentation of what is sold to whom. Since the Food-services Department must be self supporting, a direct linkage between food planning, purchasing, accounting, physical inventory and fixed assets is essential. This system will also assist with menu planning, including alternative food items of equal nutritive value but lesser cost.

13. Fixed Assets. The Tulsa Public Schools have an enormous investment in fixed assets such as land, buildings, furniture and buses. This system will provide for the proper accounting, including depreciation, of these resources.

14. Maintenance System. More efficient services will be possible with accurate information on maintenance schedules for buildings and equipment, operational cost analyses, energy consumption data and monthly labor costs.

D. FINANCIAL CONTROL Group

This group consists of those support functions required to provide for the stewardship and proper expending of district funds. All functions of this group must meet not only local, state and federal requirements but must also follow the generally accepted accounting procedures and the guidelines of both the external and the internal auditor.

15. Cash Flow. Prudent management of cash-on-hand can provide a sizable source of additional revenue to the district. By not paying vendors until required, taking all discounts allowed and investing cash-on-hand in interest-bearing securities, the district can make money on its money. To do this, the Treasurer must have accurate, current reports of the district's cash-on-hand.

16. Accounting and Budget. The budgeting process begins with an estimation of funds available to the school district for the coming year from the various revenue sources. This is coupled with a management plan to serve the educational needs of students, with the available funds allocated to the various functional accounts. As expenditures are made, these are charged against the appropriate accounts. A system to create and control this entire process should be integrated with the Fixed Assets system, the Physical Inventory system, the Purchasing system, the Cash Flow system and any other system requiring accountability of funds. This system should reflect estimated versus actual revenues, planned versus actual expenditures, and the monitoring of expenditures within the restrictions of law and Board policy.

17. Payroll. The accurate calculation of payrolls and the timely payment of all employees can be accomplished only with the aid of a computerized payroll system. Such a system must also have the capability to calculate, withhold and report various deductions from employees' payroll warrants, in conformity with state and federal requirements and employee requests. The payroll system must, of course, be closely integrated with the Personnel Information systems and the Accounting and Budget system.

18. Student Activity Funds. Collectively the one-hundred Tulsa schools operate a $2,000,000 a year business to finance the student activity programs in the various schools. This system must properly control and account for the revenues to and expenditures from each of these school accounts. This system must meet all legal requirements and accepted accounting procedures and give a periodic status report on each school's account.

E. PERSONNEL INFORMATION Group

A major activity within the school system is maintaining and coordinating the necessary staff to accomplish the goals of the district. This requires the maintenance of data on each employee throughout, and even beyond, his term of employment with the Tulsa Public Schools. Such data must be kept current and be readily available to other systems requiring it for their operations. In addition, there must be the capability to compile and summarize personnel information for responding to questions from various regulatory agencies and the public.

19. Personnel Records. Each employee's personnel record is to be created and maintained by the Personnel Services Division but made available to all other systems and authorized individuals. Each data item, such as the employee's name, will

appear only once in the entire data base, but will be accessible to all other systems, such as Payroll and Position Control, as necessary to perform their functions. The personnel reports required by the Oklahoma State Department of Education will also be generated by this system.

20. Position Control. This system should reflect the current status of all positions in the district, including the number of authorized positions, by classification, a description of each position, the salary range, whether the position is filled and by whom, a listing of all existing vacancies and a roster of all qualified applicants who could be considered for a given job opening. Such a system should greatly facilitate the filling of vacancies and responding to personnel information requests.

21. Employee Benefits. This system, which will be closely integrated with the Personnel Records and Payroll systems, will monitor all employee benefits such as vacations, sick leave, leaves of absence and insurance.

F. CURRICULUM INFORMATION Group

Of the six major groups, these systems will serve the needs of students most directly. The functions of instruction, guidance, curriculum development and student activities will be supported by these systems.

22. Curriculum Records. Uniform course descriptions and periodic revision of curriculum materials will be made much easier by this system. This will help to insure that course offerings and materials are consistent with current trends, will make the transfer of students between schools easier and will facilitate the Student Scheduling system.

23. Activity Schedule. Participation in student activities is sharply curtailed when two or more events are scheduled at the same time. Yet avoidance and/or resolution of these conflicts is very difficult to do manually when there are ten senior highs, twenty junior highs and seventy elementaries. This centralized system will generate an activities schedule matrix, making it possible to minimize time conflicts which would be detrimental to attendance at school events.

24. Computer Assisted Instruction. A computer-assisted instructional program provides instructional services via computer terminals. A computer program is used to present learning materials, to evaluate student response, to determine the sequence and level of difficulty of each task a student does, and to keep records of student achievement. Material is presented at the level which a student's previous performance indicates is appropriate for him. Each response of the student brings a corresponding response from the computer program. This interaction provides immediate reinforcement for correct responses and gives the student the opportunity to correct errors. Skills may be sequenced in order of difficulty within each skill area. Student weaknesses are diagnosed and assignments are made according to mastery of skills. The computer directs the student into precise levels of drill needed. The CAI program supplements the classroom experiences of the student, but does not replace the teacher. Problem solving, drill and practice, modeling and simulation, tutorial and dialogue are examples of CAI programming.

25. Computer Managed Instruction. A computer-managed instructional system supports individualized learning by generating and scoring examinations, diagnosing and prescribing learning activities and maintaining statistics on student achievement. CMI provides a recordkeeping function to sustain criterion-referenced testing programs in which teachers define the curriculum and evaluation procedures. Student achievement data on course objectives is also continuously and systematically collected, with the data being processed and reported to students, teachers and administrators. The results are stored in the computer for future use in course refinement, test item analysis, program evaluation and reports to parents. CMI is supportive in all curriculum areas and grade levels and provides educators a means of tracking the educational progress of students.

26. Guidance. The installation of any of several purchased computer software systems will supplement the efforts of the counselor in helping students with vocational guidance and/or educational planning. These systems utilize information about the student's interests and aptitudes to guide him to a career or vocation decision and/or the selection of an appropriate college, university or technical school. These systems are particularly efficient in performing the very time-consuming information-giving function, thereby releasing the counselor to engage in more personalized types of interaction with students.

APPENDIX G: Risk Assessment and Prioritization

It was evident to the Task Force that implementation of a full information system would have to be accomplished in a series of steps extending over several years. To set priorities for the development of the various systems, a risk assessment procedure was utilized.

Five criteria were selected as important determiners of the priority to be assigned each system. These are as follows:

a. Cost Effectiveness. Will this system result in actual savings in operational costs, or will it yield a high ratio of educational benefits to the cost of implementing the system?

b. Problem Solving. Will this system solve certain critical problems in the operations of the school district?

c. New Data. Will this system provide new data which was not previously available for decision making?

d. Ease of Implementation. How difficult and time consuming will it be to implement this system?

e. Political Impact. Will this system have the support of important power groups and/or individuals?

Using a scale of one to ten, members of the Task Force individually ranked the twenty-six systems on each of the five criteria. The composite results of their rankings are shown in the following table.

Because of the high degree of interface between the data bases, certain of the proposed systems must be developed concurrently. An example is the systems for Payroll, Personnel Records and Accounting and Budget. Because data from one system feeds directly to another of these systems, they must be developed simultaneously. For this reason, the SYSTEMS DEVELOPMENT SCHEDULE shown on page 14 does not follow exactly the priority listing indicated. While the Task Force rankings can be valuable as a general guide, other adjustments in priorities will also no doubt be necessary as development of the total information system proceeds.

Prioritization of Systems
for Order of Implementation

Rank	System	Cost Effectiveness	Problem Solving	New Data	Ease of Implementation	Political Impact	Total Rating
1	Student Records	65	76	64	45	67	317
2	Payroll	58	72	44	59	76	309
3	Guidance	48	62	67	63	69	309
4	Personnel Records	54	72	64	48	65	303
5	Bus Scheduling	66	68	68	34	61	297
6	Statistical Analysis	54	63	64	52	53	286
7	Physical Inventory	67	69	70	31	48	285
8	Ad Hoc Reporting	47	60	69	39	68	283
9	Testing and Test Score Analysis	56	56	58	55	58	283
10	Student Scheduling	48	67	56	56	52	279
11	Position Control	55	52	61	50	60	278
12	Accounting and Budget	55	63	55	45	59	277
13	Purchasing	62	56	55	40	58	271
14	Food Planning	61	58	59	41	51	270
15	Student Activity Funds	50	62	50	50	58	270
16	Computer Assisted Instruction	42	47	60	52	64	265
17	Maintenance System	56	60	62	41	44	263
18	Computer Managed Instruction	42	50	64	47	57	260
19	Planning and Reporting	54	57	57	36	56	260
20	Employee Benefits	52	54	53	53	44	256
21	Cash Flow	52	54	49	46	50	251
22	Fixed Assets	47	53	49	42	47	238
23	Facilities and Equipment Scheduling	49	51	56	36	43	235
24	Curriculum Records	46	47	55	44	37	229
25	Activities Schedule	32	44	42	46	41	205
26	Policies, Procedures and Legal Requirements	32	43	54	29	41	199